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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/765,782
Filing Date: June 11, 2003
Appellant(s): SILINGER ET AL.

Sandra Thompson
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed May 9, 2007 appealing from the Office action mailed November 13, 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct. The examiner notes that the "first independent claim" refers to claim 1, while the "second independent claim" refers to claim 15.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

WITHDRAWN REJECTIONS

The following grounds of rejection are not presented for review on appeal because they have been withdrawn by the examiner.

The 103 portion of the 102/103 rejection of claims 1, 2, 9 and over Admitted Prior Art (Fig. 1, Page 1 of applicant's disclosure) is withdrawn.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

Applicant's Admitted Prior Art as shown in Fig. 1of the Specification.

4772371	Lace et al.	09-1988

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 2, 9 and 12 are rejected under 35 U.S.C. 102(b) as anticipated by Admitted Prior Art (Fig. 1, Page 1 of applicant's disclosure).

Regarding claim 1, Admitted Prior Art teaches a plating system comprising: an elongated upper channel and an elongated lower channel (shown in Prior Art Fig. 1 of the disclosure); and a plating solution sparger 11 in Fig. 1 comprising a series of inlets oriented to direct any plating solution flowing through the inlets into one and towards another of the upper and lower channels. The plating solution inlets to the vertical spargers of Admitted Prior Art as shown in Fig. 1 are broadly interpreted to be a horizontal sparger.

Regarding claim 2, Admitted Prior Art teaches the system of further comprising: an anode 14; and a substantially planar cathode 90 comprising a first surface conductive surface, a second conductive surface, and a perimeter edge, the first conductive surface and second conductive surface being substantially parallel to each other and positioned on opposite sides of the cathode; wherein the sparger 11 is positioned at least as close to the perimeter edge of the cathode as to either of the first or second conducting surface (see Fig. 1).

Regarding claim 9, Admitted Prior Art teaches the sparger is positioned horizontally and directs any plating solution flowing through the inlets into the lower channel and towards the upper channel (see Fig. 1).

Regarding claim 12, Admitted Prior Art teaches a plurality of anodes 14 positioned outside and along the length of the upper and lower channels (see Fig. 1).

Claim Rejections - 35 USC § 103

Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted Prior Art in view of Lace et al. (assuming Admitted Prior Art does not teach a horizontal sparger).

Regarding claim 1, Admitted Prior Art teaches a plating system comprising: an elongated upper channel and an elongated lower channel (shown in Prior Art Fig. 1 of the disclosure); and a plating solution sparger 11 in Fig. 1 comprising a series of inlets oriented to direct any plating solution flowing through the inlets into one and towards another of the upper and lower channels.

Admitted Prior Art differ from the instant claims in that the reference does not explicitly teach the horizontal sparger.

Lace et al. teach a sparger 25 comprising a plurality of inlets 48 (Fig. 5) to permit the flow of electrolyte towards the cathode in a plane substantially coplanar with the cathode 66.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the apparatus of Admitted Prior Art by using the

horizontal sparger of Lace et al., because it would permit the substrate to receive fresh electrolyte continuously and to continuously discharge partially-spent electrolyte during cell operation, and because it would permit higher current densities to be used without adverse affect upon the plated deposit (column 2 lines 53-62 of Lace et al.).

Further, Admitted Prior Art differs from the instant claims in that the Admitted Prior Art teaches a sparger directing a plating solution flowing through the inlets towards the cathode but does not explicitly disclose the flow is in a plane substantially coplanar with the cathode (claim 3); nor the specific width of the channel dimensions (claims 8, 10, 11 and 14).

Lace et al. teach an electroplating apparatus for high-speed electroplating a cathodic strip of metal passed there through. The apparatus includes an elongated cell subdivided into a plurality of sub-cells defined by bottom and side walls and slotted partition walls for passage of the strip from one sub-cell to the next. Each sub-cell is provided with a pair of anodes, and means are provided for circulating electrolyte continuously in and through each sub-cell. (See abstract.) Lace et al. additionally teach a sparger 25 comprising a plurality of inlets 48 (Fig. 5) to permit the flow electrolyte towards the cathode in a plane substantially coplanar with the cathode 66.

Regarding claim 3, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the sparger of Admitted Prior Art by using the flow distributor of Lace et al. such that the flow is in a plane substantially coplanar with the cathode, because it would enable the substrate to be plated with high current densities and with high efficiency, thus resulting in a greater

quantity of material, i.e. a greater length of strip, to be uniformly electroplated in unit time in an apparatus occupying the space of a larger conventional cell or, expressed another way, equivalent amounts of material can be electroplated in a cell occupying less space (column 6 lines 18-27 of Lace et al.)

Regarding claims 8, 10, 11 and 14, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have recognized that the distance between the shield and the cathode affects the degree in which the electric field lines, extending from the anode to the cathode, reach the edge of the cathode or substrate. It is known that charge buildup tends to occur at edges of the cathode substrate causing a greater concentration of material deposition to occur in these areas and thus resulting in nonuniformity of the electroplated metal on the substrate. It would have been obvious to one having ordinary skill to have modified the distance between the shield and the cathode of Admitted Prior Art through routine experimentation in order to prevent charge buildup at the cathode substrate edges and thus reducing nonuniformity in the electroplated metal. Furthermore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have reduced the distance between the shield and the cathode of Admitted Prior Art, because electroplating apparatus can be made to occupy less space.

Regarding claim 4, Admitted Prior Art teaches each of the upper and lower channels comprises two substantially planar and parallel non-electrically conductive sides (page 1, lines 17-18, applicant's disclosure) that are substantially parallel to the

cathode; and the cathode is positioned at least partially within each of the upper and lower channels between the non electrically conductive sides (see Fig. 1).

Regarding claim 5, Admitted Prior Art teaches the upper and lower channels are positioned opposite each other and are separated from each other, the separation between the channels forming a pair of solution egress slots (see Fig. 1); and the channels are adapted to prevent current from flow between the anode and cathode other than through the egress slots (see Fig. 1).

Regarding claim 6, Admitted Prior Art teaches the egress slots are positioned approximately parallel to a center line of the cathode (see Fig. 1).

Regarding claim 7, the apparatus of Admitted Prior Art is structurally capable of plating a cathode comprising a dielectric substrate and conductive surfaces.

Regarding claim 13, Admitted Prior Art teaches the upper channel and lower channel are separated by a distance. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the apparatus of Admitted Prior Art by varying the distance, because it would allow substrates of different sizes to be uniformly electroplated.

Regarding claim 15, Admitted Prior Art teaches a plating system comprising: an anode 14 (Fig. 1, and page 1 of the instant disclosure), a planar cathode 90, a sparger 11, and a plurality of electrically insulating shields 13; wherein each of the plurality of shields is positioned between the anode and the cathode, and each of the plurality of shields is approximately co-planar with one of two reference planes that are

substantially parallel to the cathode; and the sparger is adapted to direct plating fluid toward and edge of the cathode.

Admitted Prior Art teaches the apparatus as described above. Admitted Prior Art differs from the instant claims in that the Admitted Prior Art teaches a sparger directing a plating solution flowing through the inlets towards the cathode but does not explicitly disclose the flow is in a plane substantially coplanar with the cathode.

Lace et al. teach an electroplating apparatus for high-speed electroplating a cathodic strip of metal passed therethrough. The apparatus includes an elongated cell subdivided into a plurality of sub-cells defined by bottom and side walls and slotted partition walls for passage of the strip from one sub-cell to the next. Each sub-cell is provided with a pair of anodes, and means are provided for circulating electrolyte continuously in and through each sub-cell. (See abstract.) Lace et al. additionally teach a sparger 25 comprising a plurality of inlets 48 (Fig. 5) to permit the flow electrolyte b6towards the cathode in a plane substantially coplanar with the cathode 66.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the sparger of Admitted Prior Art by using the flow distributor of Lace et al. such that the flow is in a plane substantially coplanar with the cathode, because it would enable a substrate to be plated with high current densities and with high efficiency, thus resulting in a greater quantity of material, i.e. a greater length of strip, to be uniformly electroplated in unit time in an apparatus occupying the space of a larger conventional cell or, expressed another way, equivalent amounts of material can be electroplated in a cell occupying less space (column 6 lines 18-27 of

Lace et al.). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have further modified the apparatus of Admitted Prior Art by using the horizontal sparger of Lace et al., because it would permit the substrate to receive fresh electrolyte continuously and to continuously discharge partially-spent electrolyte during cell operation, and because it would permit higher current densities to be used without adverse affect upon the plated deposit (column 2 lines 53-62 of Lace et al.).

(10) Response to Argument

The applicant argues on page 6 that the applicant's Admitted Prior Art does not teach a plating solution horizontal sparger. The examiner respectfully disagrees. The applicant defines the horizontal sparger as a series of inlets in the lower plenum to direct plating solution flowing through the inlets into the lower channels. The examiner asserts, as stated on page 3 of the final Office Action mailed November 13, 2006 and clarified in the Advisory mailed on April 21, 2007, that the **series of inlets** – not the vertical spargers -- on the bottom of the plating compartment 12 of Fig. 1 for feeding the plating solution into the vertical spargers are interpreted to read on the horizontal spargers of the instant claims.

The applicant quotes the examiner's phrase in the final Office Action that "the vertical spargers of Admitted Prior Art as shown in Fig. 1 are broadly interpreted to be a horizontal sparger." However, the examiner's phrase has been taken out of context. The examiner actually stated, on page 3 of the final Office Action, that "[t]he plating solution **inlets** to the vertical spargers of Admitted Prior Art as shown in Fig. 1 are

broadly interpreted to be a horizontal sparger." To reiterate, it is the **series of inlets** on the bottom of the plating compartment 12 of Fig. 1 for feeding the plating solution into the vertical spargers, and not the vertical spargers themselves, that are interpreted to read on the horizontal spargers of the instant claims.

The applicant further argues that the instant application eliminates the tubular vertical spargers of Admitted Prior Art and replaces them with horizontal spargers. As stated in the Advisory, independent claims 1 and 15 use "comprising" language, therefore, even though the Admitted Prior Art provides the vertical spargers 11 on the series of inlets (i.e., horizontal spargers), the Admitted Prior Art reads on the instant claims.

The applicant further argues on page 10 that the instant invention improves on the Admitted Prior Art by increasing the solution velocity, moving the shields closer to the parts to be plated, incorporating part hoarding clamps, and incorporating a couple rinsing and drying process. However, the applicant is arguing limitations or advantages that are not in the independent claims. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

The applicant further argues on page 11 that that the Lace reference does not disclose replacing the vertical spargers with a horizontal sparger. This may be true. However, the examiner relies on the Lace reference to teach the use of a horizontal sparger. It would have been obvious to one having ordinary skill in the art to have replaced the vertical spargers of Admitted Prior Art with the horizontal sparger of Lace

et al., because it would permit the substrate to receive fresh electrolyte continuously and to continuously discharge partially-spent electrolyte during cell operation (column 2 lines 53-62 of Lace et al.) as stated on page 5 of the final Office Action.

It is further noted that since the examiner is not relying on the vertical spargers to meet the horizontal sparger of the instant claims, the plurality of shields 13 of Admitted Prior Art is not between the sparger and the cathode as stated in claim 15.

(11) Related Proceeding(s) Appendix

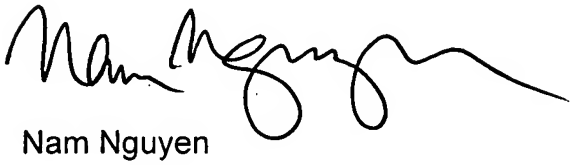
No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Luan V. Van

Conferees:



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